APPENDIX 4
Single-lattice reception diagram

If we assume a back-to-back operation, it is indeed possible to simplify the diagram of Figure 10 by using the equation that fulfils a null ISI. The single-lattice diagram of Figure 10a is then obtained. In this case, only the null ISI and the phase linearity of the sending filter are provided.

The validity of this drawing of Figure 10a can be verified from the equation (37) of the patent after multiplication by z^{-1}. For a so-called back-to-back system, the input signal of the reception filter is given by:

$$Y(z) = z^{-1}[F_0(z^4) + z^{-1}F_1(z^4) + z^{-2}\hat{F}_1(z^4) + z^{-3}\hat{F}_0(z^4)]X(z^4) \quad (53)$$

Referring to Figure 10a, the signals after decimation are given, from top to bottom, by:

$$\begin{array}{ll} Y(z)\downarrow_4 = z^{-1}\hat{F}_0(z)X(z), & z^{-1}Y(z)\downarrow_4 = z^{-1}\hat{F}_1(z)X(z), \\ z^{-2}Y(z)\downarrow_4 = z^{-1}F_1(z)X(z), & z^{-3}Y(z)\downarrow_4 = z^{-1}F_0(z)X(z) \end{array} \quad (54)$$

At input of the direct lattice, the signals are therefore given, from top to bottom, by:

$$z^{-1}[\hat{F}_0(z) + \hat{F}_1(z)]X(z) \text{ et } z^{-1}[F_0(z) - F_1(z)]X(z).$$

The output signal is therefore:

$$S(z) = 2gz^{-1}[F_0(z)\hat{F}_0(z) + F_1(z)\hat{F}_1(z)]X(z) = 2gz^{-1}[\gamma z^{-n}], \quad (55)$$

with

$$\gamma = \prod_{i=0}^{n}(1 + \alpha_i^2).$$

It is thus verified that for $g = 1/\gamma$, the output signal is identical to the input signal except for the $n + 1$ sample delay.